UNITED STATES DEPARTMENT OF AGRICULTURE

NATURAL RESOURCES CONSERVATION SERVICE

and the

UNIVERSITY OF ARIZONA AGRICULTURAL EXPERIMENT STATION

and

AGRICULTURAL RESEARCH SERVICE

NOTICE OF NAMING AND RELEASE OF 'LOETTA' ARIZONA COTTONTOP *(DIGITARIA CALIFORNICA)*

The U.S. Department of Agriculture, Natural Resources Conservation Service, the University of Arizona Agricultural Experiment Station, and the U.S.D.A. Agricultural Research Service announce the naming and release of 'Loetta' Arizona cottontop (*Digitaria californica* [Benth.] Henr.) for commercial production and marketing of seed and plants.

Origin:

'Loetta' Arizona cottontop was originally collected by Larry Holzworth from a native stand on the Santa Rita Experimental Range, Pima County, Arizona in October, 1975. The collection area is located at T18S, R14E, in the southwest ¼ of Section 3. The elevation is 2,982 feet and the average annual rainfall is 11 inches. The mean annual temperature is about 63 °F. The mean winter temperature is about 50 °F and the mean summer temperature is about 76 °F.

Identification Numbers Used:

'Loetta' Arizona cottontop has been evaluated under the following reference numbers:

> 9003705, A-18679: Tucson, Arizona USDA Natural Resources Conservation Service, Tucson Plant Materials Center.

'Loetta' Arizona cottontop has been assigned the following identification numbers:

> P.I. Number: 610665
>
> **NSSL:** 389518.51

Description:

Arizona cottontop is a native, perennial bunchgrass that contributes considerable range forage in the Southwest, from southern Colorado to Texas, Arizona, and northern Mexico (Gould and Shaw, 1983). This species can be found in the oak woodland, chaparral, and semidesert grassland types in Arizona between 300 and 1,800 m elevation (Judd 1962, Humphrey 1960) and grows on a variety of soils from clay loam to sandy loam as well as loose gravelly soils (Anderson et al. 1953, Schmutz and Smith 1976, Cable and Martin 1975).

John R. Reeder (University of Arizona Herbarium, Tucson, retired) confirmed the taxonomic description for 'Loetta' Arizona cottontop as: *Culms* firm, erect from a hard base, mostly 45 to 90 cm tall but occasionally much less; *Blades* flat or somewhat folded, usually glaucous, bluish-green, and glabrous or nearly so, 2 to 5 mm broad; *Ligule* membranous, 2 mm or more long; *Panicle* contracted, 10 to 15 cm long, with relatively few branches, these erect, usually appressed; spikelets 3 to 4 mm long excluding the hairs; *Second glume* narrow, densely villous with soft, silvery hairs 2 to 4 mm or more long; *Sterile lemma* broad, three-nerved, villous on the margins but glabrous on the internerves; *Grain* ovate-lanceolate, abruptly narrowing to a short awn-tip, mostly 2.5 to 3.0 mm long.

Cable (1979) states that Arizona cottontop is considered as a climax dominant species in the semidesert grassland type. This species does have several morphological and physiological characteristics that allow it to tolerate severe climatic conditions or use:

1. Individual culms and roots are long-lived
2. Culms exhibit low-level apical dominance.
3. Removing the growing point at the beginning of the summer growing season stimulates the sprouting and growth of axillary shoots.
4. Cottontop plants utilize both winter and summer precipitation.
5. Shoots are produced throughout the growing season.
6. Inflorescences mature throughout the summer growing season and continue as long as soil moisture is available.
7. Cottontop is highly palatable to livestock and wildlife.
8. Cottontop tolerates relatively heavy grazing use over long periods.
9. Cottontop extracts soil water rapidly when it is available. It is also able to endure prolonged periods in soil with essentially no available water.
10. An established stand of Arizona cottontop competes strongly with velvet mesquite seedlings.
11. Cottontop can be successfully reseeded on upland areas receiving at least 11 inches (28 cm) of annual precipitation.
12. Cottontop is only moderately affected by fires.
13. Cottontop is highly flexible in its adaptability to management strategies provided grazing intensity is held below 60%. Light summer use 2 years out of 3 is recommended to maintain optimum vigor while at the same time stimulating axillary sprouting to increase productivity.

Arizona cottontop is both self-pollinated and cross-pollinated. More than half of the florets of an Arizona cottontop plant are self-pollinated. The self-pollinated ovaries can mature to viable seed despite a lack of soil moisture preventing the panicle from emerging from the sheath (Cable, 1979).

Arizona cottontop is dormant during dry periods, but does make use of both winter and summer precipitation. However, most herbage is produced during the summer growing season (Cable 1979). It responds quickly to spring and summer rains and also responds with rapid growth following winter precipitation (Gould & Shaw 1983, Humphrey 1970). Essentially all basal culms produced in any given year sprout during the spring growing period. Summer growth on most basal culms is a continuation of growth on shoots that sprouted during spring. Shoots are produced throughout the growing season. The inflorescence begin to emerge two to three weeks after growth starts in the summer and the uppermost spikelets begin to fall within five to eight days of full emergence. All seeds on a panicle have usually fallen within seven to eight days of first shatter. New panicles continue to be produced into the fall as soil moisture remains available (Cable 1979).

Because Arizona cottontop has low-level apical dominance and a large reservoir of buds at culm nodes, numerous axillary shoots develop over the growing season. Removing the growing point at the beginning of the summer growing season stimulates the sprouting and growth of axillary shoots (Cable 1979). Arizona cottontop is particularly tolerant of fire because the growing points are just at or below the ground surface (Scifres 1980).

Seed longevity was evaluated by Tiedemann and Pond (1967) using germination trials on seven batches of cottontop seed kept under uncontrolled storage conditions at the Santa Rita Experimental Range headquarters for periods varying from 3 to 30 years. These tests showed that seed maintained a relatively high germination (>80%) for about 3 years. Germination was noted to decline about 6% per year for the next 12-14 years, to less than 10%.

Development and Use:

'Loetta' Arizona cottontop was first comparatively evaluated with **22** accessions of *Digitaria* (*Trichachne*) californica (A-18679) in the 1976 Arid Land Grass Initial Evaluation Planting (IEP) conducted at the Tucson Plant Materials Center. This IEP trial was initiated to evaluate various grasses for stand establishment, vigor, seed production, forage production, and ability to spread. 'Loetta' was determined to be the best performing Arizona cottontop accession (see Table 1.) and moved into the Advanced Evaluation process (Briggs, 1980).

P.I. No.	A. No.	Origin	Year	Vigor*	Forage Prod. (kg/m^2)	Forage Quality*	Seed Prod.'	Head/ Leaf Height (cm)	Stand Rating*	Remarks
9003705	18679	AZ	1976	3		5	5	92/46	3	
			1977	2	0.6		1	110/70	1	Best Accession
			1978	1	0.3		1	110/60	1	Best Accession
			1979	6	0.3	7	5	50130	1	
			1980	5		6	5		1	
			Avg	3.4						

*Ratings: 1= excellent; 3= good; 5= fair: 7= poor; 9= very poor

This accession was also evaluated in a 1993 planting at the Avra Valley Planting Site. This planting was installed to evaluate species in advanced testing for their ability to become established on retired cropland. Three planting depths were evaluated: 0.25, 0.5, and **1** inch. 'Loetta' Arizona cottontop showed no significant difference in average number of seedlings emerged per foot at the 0.25 and 0.5 inch planting depths. The 1 inch planting depth showed significantly fewer emerged seedlings in comparison with the 0.25 inch planting depth (Figure 1).

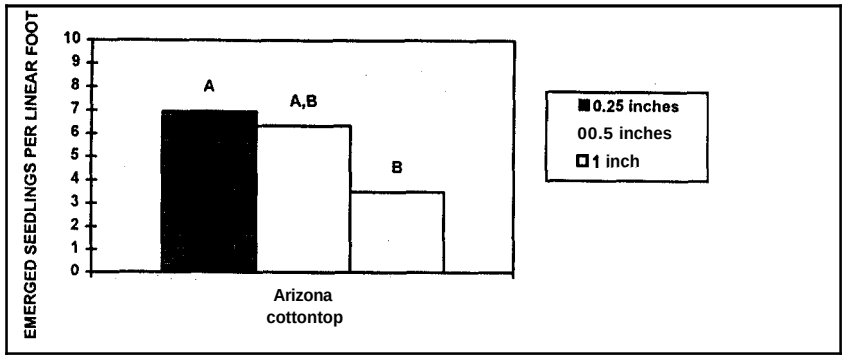


Figure 1. Average number of emerged seedlings per linear foot at three planting depths. Means with different letters are significantly different at the 0.05 level of significance.

The amount of water required for significant emergence of ten accessions of Arizona cottontop was measured in a greenhouse experiment using a line-source gradient irrigation system (Smith et al.). This experiment showed that variation in the water required for emergence in Arizona cottontop was associated both with average summer precipitation and soil characteristics at the site of origin of the accessions evaluated. Accessions from sites such as the Santa Rita Experimental Range with more summer precipitation and from soils with lower water holding capacity tended to have higher water requirements for emergence (Table 2).

Accession	Mean total water required in days 1-3 for 50% emergence by day 8 (mm)[1]	Mean summer precipitation (mm) (no. months)[2]	Soil water content (% of dry weight at rnatric potential of -1.5 MPa)[3]
Chihuahua	11.90 a	265 (5)	--
Durango	11.82 a	377 (5)	--
Robles Junction	11.43 ab	180 (4)	3.0
Van Horn	11.35 ab	194 (4)	--
Douglas	10.89 ab	244 (4)	4.0
Sierra Vista	10.10 bc	232 (5)	4.4
'Loetta'	10.07 bc	225 (4)	3.8
San Simon	10.06 bc	143 (4)	7.6
Oracle Junction	10.03 bc	151 (3)	5.9
Bowie	8.89 c	140 (4)	6.4
(Mean)	10.1	215	4.6

This accession was also evaluated in the Southwestern Borderlands Savanna Grassland Ecosystem Restoration Study beginning in 1997. Seven species, including 'Loetta', were seeded

'Means of estimates from five experiments assuming the normal distribution for the probit model. Means followed by different letters are significantly different (P>0.05) based on Duncan's Multiple Range Test.

'Total precipitation in months with mean minimum temperature > 13°C at the site of precipitation measurement if available. If minimum temperature data were not available, data were used for nearest station within network available from National Climate Data Center.

[3] Data available for Arizona accessions only. Means followed by different letters are not significantly different by sequential Mann-Whitney *U*-tests among adjacent means (P>0.05).

into a severely denuded site. Despite below average summer precipitation, 'Loetta' Arizona cottontop performed very well in terms of emergence and establishment.

At the Tucson Plant Materials Center, 'Loetta' Arizona cottontop has been harvested using a Woodward Flail-Vac Seed Stripper using a brush speed of **200** rpm. After drying the harvested material is then processed through a Westrup Laboratory Brush Huller/Scarifier to remove the hairs from the glumes. The material is then processed through a dual screen air separator using a **#8** top screen and a $\#^{1}/_{23}$ bottom screen. The hairs are removed for easier storage and to allow the seed to flow through drill tubes when seeding. The seed **is** stored in a walk-in seed storage locker at **34** °F and **30%** relative humidity. It is estimated that 'Loetta' produces **614,500** seeds per pound.

Area of Adaptation:

'Loetta' Arizona cottontop is best adapted to Major Land Resource Areas 40-1, **40-2, 40-3, 41-2,** and **41-3** in southern Arizona and southwestern New Mexico.

Arizona cottontop is found on plains, and hillsides on open, well-drained sites (Gould **1978).** Other diverse areas in which it is found include mesas and rocky hills of Arizona (Kearney et al. 1960), deep hardland range sites in Texas (Brock et al. 1978), and broad alluvial plains, fans, and river bottoms in the Sonoran and Chihuahuan deserts (Cox et al. **1982).**

Arizona cottontop can be found growing on a wide variety of soils, including clayey loam, sandy loam, and loose gravelly soils, as well as limestone ledges and porphyritic hills. However, it is more abundant and productive on clay, sand, or sandy-loam subsoils than on shallow, stony, or cobbly soils (Cable **1979).** In the low fertility soils of some desert sites, Arizona cottontop thrives under mesquite shrubs, where nitrogen, sulfur, and phosphorous availability is much higher. Arizona cottontop does show evidence of chlorosis and low fertility on some open desert sites (Tiedemann and Klemmedson **1973).**

Arizona cottontop has been recorded at elevations shown in Table **2** (Bridges **1941,** Brock et al. **1978,** Cox et al. **1982,** Gould **1978,** Harrington **1964,** Medina and Garza **1987,** McClaran and Anable **1992,** Wright **1974):**

Table 2.
Recorded elevations for Arizona cottontop

Area	Elevation (feet)	Elevation (meters)
Arizona	1.000 - 6.000	305 - 1.830
Sonoran & Chihuahuan Deserts	0 - 6,050	0 - 1,859
Colorado	5,500 - 5,800	1,675 -1,770
Mexico	3,940 - 5,250	1,200 - 1,600
New Mexico	4,300	1,310
Texas	1,260 - 3,200	384 - 975

Within its geographical range, Arizona cottontop grows in a wide variety of precipitation regimes, from areas of spring and summer maxima separated by dry periods in Arizona , to high-summer, low winter types in Texas (Cable **1979).** In much of its range, precipitation arrives in two periods: (1) winter frontal systems during November to March, and **(2)** summer convection storms from June to September. However, across the region annual precipitation and time of occurrence is extremely variable and extended drought is common.

Environmental Consideration:

This release is an indigenous selection collected from within the specie's natural range of adaptation. This species is documented as having beneficial qualities and no negative impacts on wild or domestic animals. This species has beneficial qualities in terms of diet for wildlife species including pronghorn antelope, mule deer, desert cottontail, whitethroat woodrat, javalina, and scaled quail. The test plots supporting this release were made in close proximity to natural and induced plant ecosystems. There was no evidence of negative impacts or invasion into these ecosystems.

Seed Source:

The Tucson Plant Materials Center will be responsible for maintaining a supply of foundation and breeder seed. Foundation seed will be available for establishing seed source nurseries for commercial production through the Arizona Crop Improvement Association (A.C.I.A.). Standards for all classes of seed will be included in the Arizona Seed Certification Handbook. The suggested release date for 'Loetta' Arizona cottontop is August 30, 1999. Limited quantities will be available for commercial production in 2000.

Literature Cited

Anderson, D., L.P. Hamilton, H.G. Reynolds, and R.R. Humphrey. 1953. Reseeding Desert Grassland Ranges in Southern Arizona. Ariz. Agric. Exp. Stn. Bull. 249, 32p.

Bridges, J.O. 1941. Reseeding Trials on Arid Range Land. Bulletin 278. Las Cruces, NM: New Mexico State University, Agricultural Experiment Station. 48p.

Briggs, J.A. 1980. 1976 Arid Land Grass IEP. Final Summary. In: Tucson Plant Materials Center 1980 Annual Technical Report. U.S.D.A. Soil Conservation Service, Tucson, AZ. Pp.9-29.

Brock, J.H., R.H. Haas, J.C. Shaver. 1978. Zonation of Herbaceous Vegetation Associated with Honey Mesquite in North Central Texas. In: Proceedings of the First International Rangeland Congress, August 14-18, 1978, Denver, CO. Denver, CO: Society for Range Management: 187:189.

Cable, D.R. 1979. Ecology of Arizona cottontop. Res. Pap. RM-209, 21p. U.S.D.A. For. Ser. Rocky Mtn. For. and Range Exp. Stn., Fort Collins, CO.

Cable, O.R. and S.C. Martin. 1975. Vegetation Responses to Grazing, Rainfall, Site Condition, and Mesquite Control on Semidesert Range. U.S.D.A. For. Serv. Res. Pap. RM-149, 24p. Rocky Mtn. For. and Range Exp. Stn., Fort Collins, CO.

Cox, J.R., H.L. Morton, T.N. Johnson Jr. 1982. Vegetation Restoration in the Chihuahuan and Sonoran Deserts of North America. Agricultural Reviews and Manuals ARM-W-28. Washington, D.C.: USDA Agricultural Research Service. 37p.

Gould, F.W. 1978. Common Texas Grasses. Texas A&M University Press, College Station, TX. 267p.

Gould, F.W. and R.B. Shaw. 1983. Grass Systematics. 2nd Edition. Texas A&M University Press, College Station, TX. 213 p.

Harrington, H.D. 1964. Manual of the Plants of Colorado. 2nd edition. The Swallow Press Inc, Chicago, IL. 666 p.

Humphrey, R.R. 1960. Arizona Range Grasses. Ariz. Agric. Exp. Stn., Bull. 298, 104p.

Humphrey, R.R. 1970. Arizona Range Grasses: Their Description, Forage Value and Management. University of Arizona Press, Tucson, AZ. 159p.

Judd, B.I. 1962. Principal Forage Plants of Southwestern Ranges. U.S.D.A. For. Serv., Rocky Mtn. For. and Range Exp. Stn., Stn. Pap. 69, 93p.

Kearney, T.H., R.H. Peebles, J.T. Howell, E. McClintock. 1960. Arizona Flora. 2nd edition University of California Press, Berkeley, CA. 1085p.

Medina, T.J.G. and H.C. Garza. 1987. Range Seeding Research in Northern Mexico. In: Proceedings of Symposium "Seed and Seedbed Ecology of Rangeland Plants", April 21-23, 1987, Tucson, AZ. Washington D.C.: USDA Agricultural Research Service: 246-259.

McClaran, M.P. and M.E. Anable. 1992. Spread of Introduced Lehmann Lovegrass Along a Grazing Intensity Gradient. Journal of Applied Science. 29(1):92-98.

Pater, M. 1996. Avra Valley Retired Farmland Revegetation Trials. Final Report. In: Tucson Plant Materials Center 1996 Annual Technical Report. U.S.D.A. Natural Resources Conservation Service, Tucson, AZ pp.49-59.

Schmutz, E.M. and D.A. Smith. 1976. Successional Classification of Plants on a Desert Grassland Site in Arizona. J. Range Manage. 29(6):476-479.

Scifres, C.J. 1980. Fire and Range Vegetation of the Rio Grande Plains. In Proceedings of Symposium: "Prescribed Range Burning in the Rio Grande Plains of Texas", November 7, 1979, Carrizo Springs, TX. Texas A&M University, College Station, TX.

Smith, S.E., E. Riley, J.L. Tiss, and D. Fendenheim. *In Press.* Geographical Variation in Predictive Seedling Emergence in a Perennial Desert Grass. J. Ecol.

Tiedemann, A.R. and F.W. Pond. 1967. Viability of grass seed after long periods of uncontrolled storage. J. Range Manage. 20(4):261-262.

Tiedemann, A.R. and J.O. Klemmedson. 1973. Nutrient Availability in Desert Grassland Soils under Mesquite (Prosopis juliflora) trees and adjacent open areas. Soil Science Society of America Proceedings. 37:107-111.

Wright, H.A. 1974. Effect of Fire on Southern Mixed Prairie Grasses. Journal of Range Management. 27(6):417-419.

State Conservationist, Arizona
USDA Natural Resources Conservation Service

Date

for Richard L. White

Director, Ecological Sciences Division
USDA Natural Resources Conservation Service

3/2/00
Date

Administrator, National Programs
USDA Agricultural Research Service

Date

Director, Arizona Agricultural Experiment Station
University of Arizona

Date

Exhibit **540-27** Worksheet **for** Conducting an Environmental Evaluation on **NRCS** Plant Releases

This worksheet is used to conduct an Environmental Evaluation of Plant Materials releases. Criteria relating to the biological characteristics of a plant, the potential impact on ecosystems, the ease of managing the plant, and conservation need are scored. These scores and their interpretation are used with a decision flowchart to determine the appropriate course of action for making a release. **As** with any such ranking system, it is necessary to use sound judgement and experience when interpreting the final results.

Instructions

Rate the plant or release based on the following criteria by circling your assessment. If the criteria does not apply to the species or release, then do not rate for that criteria. If you do not have enough information on the species or plant release to complete at least Parts 1, 2 and **4** in Section **A,** then additional data must be accumulated through literature searches, cooperators, or studies to be able to complete these sections. Additional notes which may be used to clarify or interpret the ranking should be included in the margins of this worksheet.

All rating; criteria must be completed, even if it is found in Section **A,** Part 1 that the plant has a low impact on the environment. Evaluation of all criteria will provide documentation that a thorough evaluation was completed for the plant at the time of release. This documentation may be needed in the future if questions are raised about the potential invasiveness or control of the plant. **A** completed worksheet must be included with the release documentation and a copy sent to the NPMC for filing.

Name of person scoring: MARK PATER, BRUCE MUNDA Date of scoring: 01-26-2000

Scientific Name: Digitaria californica

Common Name: Arizona cottontop

Release Name: Loetta

Is the plant native to the **US?** (Yes) No

Is the plant native to the area of intended use? (Yes) No

Authority used to determine native status: * This release is based on native collections.

What is the intended area of use for this plant? southern Arizona & southwestern New Mexico (MLRA's 40-1, *40-2, 40-3,* 41-2, and 41-3)

What is the intended use for this plant? erosion control, habitat improvement, increase vegetative plant community diversity

* The taxonomic description for this proposed release was confirmed by John R. Reeder (University of Arizona Herbarium, Tucson, retired).

Section A. Scoring of Criteria for Impact, Management, Need and Biological Characteristics

Part 1: Impact on Habitats, Ecosystems, and Land Use

This section assesses the ability of the species or release to adversely affect habitats, ecosystems, and agricultural use areas.

1) Ability to invade natural systems where the species does not naturally occur

a) Species not known to spread into natural areas on its own — (0)
b) Establishes only in areas where major disturbance has occurred in the last 20 years (e.g., natural disasters, highway corridors) — 3
c) Often establishes in mid- to late-successional natural areas where minor disturbances occur (e.g., tree falls, streambank erosion), but no major disturbance in last 20-75 years — *6*
d) Often establishes in intact or otherwise healthy natural areas with no major disturbance for at least 75 years — 10

2) Negative impacts on ecosystem processes (e.g., altering fire occurrence, rapid growth may alter hydrology)

a) No perceivable negative impacts — (0)
b) Minor negative impacts to ecosystem processes — 2
c) Known significant negative impacts to ecosystems processes — *6*
d) Major, potentially irreversible, alteration or disruption of ecosystem processes — 10

3) Impacts on the composition of plant communities where the species does not naturally occur

a) No negative impact; causes no perceivable changes in native populations — (0)
b) Noticeable negative influences on community composition — *5*
c) Causes major negative alterations in community composition — 10

4) Allelopathy

a) No known allelopathic effects on other plants — (0)
b) Demonstrates allelopathic effects on seed germination of other plants — 3
c) Demonstrates allelopathic effects to mature stages of other plants — *5*

5) Impact on habitat for wildlife or domestic animals

a) No negative impact on habitat, or this criteria not applicable based on intended use for the plant — (0)
b) Minor negative impact on habitat (e.g., decreased palatability; lower wildlife value; decreased value for undesirable animal species) — 2
c) Significant negative impact on habitat (e.g., foliage toxic to animals; significantly lower value for wildlife; excludes desirable animal species from an area) — *5*

6) Impact on other land use

a) No negative impacts on other land uses — (0)
b) Minor impacts (plant could invade adjacent areas and decrease its value) — 3
c) Significant impacts (plant may alter the system or adjacent lands significantly enough to prevent certain uses) — 5

Total Possible Points 45
Total Points for Part 1 Ø

Part 2. Ease of Management

*This part evaluates the degree of management which might be needed to control the species **or** release if it becomes a problem, or eradicate the species or release **if** it is not longer desirable.*

1) Level of effort required for control

a) Effective control can be achieved with mechanical treatment — (0)
b) Can be controlled with one chemical treatment — 2
c) One or two chemical or mechanical treatments required or biological control is available or practical — 5
d) Repeated chemical or mechanical control measures required — 10

2) Effectiveness of community management to potentially control the plant release — N/A

a) No management is needed, the plant release is short-lived and will significantly decrease or disappear within 5 years under normal conditions without human intervention — 0
b) Routine management of a community or restoration/preservation practices (e.g., prescribed burning, flooding, controlled disturbance, pasture renovation) effectively controls the release — 2
c) Cultural techniques beyond routine management can be used to control the release — 4
d) The previous options are not effective for managing or controlling the release — 10

3) Side effects of chemical or mechanical control measures

a) Control measures used on release will have little or no effect on other plants — 0 N/A
b) Control measures used on release will cause moderate effects on other plants — 3
c) Control measures used on release will cause major effects on other plants — 5

**If spreads by seed, or both seed and vegetative means, go to #4
**If spreads by vegetative means only, go to #5

4) Seed banks

a) Seeds viable in the soil for 1 year or less — 0
b) Seeds remain viable in the soil for 2-3 years — (1)

c) Seeds remain viable in the soil for 4-5 years 3
d) Seeds remain viable in the soil for more than 5 years 5

5) Vegetative regeneration

a) Regeneration from resprouting of cut stumps or plant (1)
b) Regeneration from pieces of the root left in the soil 3
c) Regeneration from root or stem parts left in the soil 5

6) Resprouts after cutting above-ground parts

a) Does not resprout 0
b) Resprouts and produces seed in future years 3
c) Resprouts and produces seed in same year (5)

Total Possible Points 40

Total Points for Part 2 _7_

Part 3. Conservation Need and Plant Use

This part evaluates the importance of the species or release to meet a conservation need.

1) Potential Use(s) of the Plant Release

a) Used for low-priority issues or single use 1
b) Has several uses within conservation 2
c) Has many uses within conservation as well as outside of conservation 4
d) Has high-priority use within conservation (5)

2) Availability of Other Plants to Solve the Same Need

a) Many other plants available 1
b) Few other plants available (3)
c) No other plants available 5

3) Consequences of Not Releasing This Plant

a) No impact to conservation practices
b) Minor impact on one or more conservation practice 6
c) Serious impact on one conservation practice -
d) Serious impact on many conservation practices 5

Total Possible Points 15

Total Points for Part 3 _9_

Part 4. Biological Characteristics

This part evaluates the biological properties which indicate the natural ability of the species or release to become a pest and the ability of the species or release to affect other plants Note: these criteria relate to the species under natural conditions, as opposed to the species under managed conditions used to increase the species, i.e. seed increase programs, or specific propagation methods which do not normally occur in nature.

1) Typical mode of reproduction under natural conditions

a) Plant does not increase by seed or vegetative means (skip to #11) 0
b) Reproduces almost entirely by vegetative means 1
c) Reproduces only by seeds (3)
d) Reproduces vegetatively and by seed 5

2) Reproduction (by seed or vegetative) in geographic area of intended use

a) Reproduces only outside the geographic area of intended use 1
b) Reproduces within the geographic area of intended use 3
c) Reproduces in all areas of the United States where plant can be grown (5)

3) Time required to reach reproductive maturity by seed or vegetative methods

a) Requires more than 10 years 1
b) Requires 5-10 years 2
c) Requires 2-5 years 3
d) Requires 1 year (5)

** If reproduces only by seed, skip to #5

4) Vegetative reproduction (by rhizomes, suckering, or self-layering)

a) Vegetative reproduction rate maintains population (plant spreads but older parts die out) 1
b) Vegetative reproduction rate results in moderate increase in population size (plant spreads <3' per year) 3
c) Vegetative reproduction rate results in rapid increase in population size (plant spreads >3' per year) 5

** If reproduces only vegetatively, skip to #11

5) Ability to complete sexual reproductive cycle in area of intended use

a) Not observed to complete sexual reproductive cycle in the geographic area of intended use, but completes sexual reproduction in distant areas of the United States 1
b) Not observed to complete sexual reproductive cycle in the geographic area of intended use, but completes sexual reproduction in adjoining geographic areas 3

c) Observed to complete the sexual reproductive cycle in the geographic area of intended use — 5

6) Frequency of sexual reproduction for mature plant

a) Almost never reproduces sexually — 0
b) Once every five or more years — 1
c) Every other year — 3
d) One or more times a year — 5

7) Number of viable seeds per mature plant each reproductive cycle

a) None (does not produce viable seed) — 0
b) Few (1-10) — 1
c) Moderate (11-1,000) — 3
d) Many-seeded (>1,000)

8) Dispersal ability

a) Limited dispersal (<20') and few plants produced (<100) — 1
b) Limited dispersal (<20') and many plants produced (>100) — 3
c) Greater dispersal (>20') and few plants produced (<100) — 7
d) Greater dispersal (>20') and many plants produced (>100) — 10

9) Germination requirements

a) Requires open soil and disturbance to germinate — 1
b) Can germinate in vegetated areas but in a narrow range or in special conditions — 5
c) Can germinate in existing vegetation in a wide range of conditions — 10

10) Hybridization

a) Has not been observed to hybridize outside the species — 0
b) Hybridizes with other species in the same genera — 3
c) Hybridizes with other genera — 5

11) Competitive ability (of established plants)

a) Poor competitor for limiting factors
b) Moderately competitive for limiting factors — 6
c) Highly competitive for limiting factors — 10

Total Possible Points 70

Total Points for Part 4 43

References

Many of the criteria used in this rating system were adapted from the following sources

Hiebert, Ron D. and James Stubbendieck 1993. Handbook for Ranking Exotic Plants for Management and Control. US Department of the Interior, National Park Service, Denver, CO.

Randall, John M , Nancy Benton, Larry E Morse, and Gwendolyn A Thornhurst 1999 Criteria for Ranking Alien Wildland Weeds The Nature Conservancy, Arlington, VA

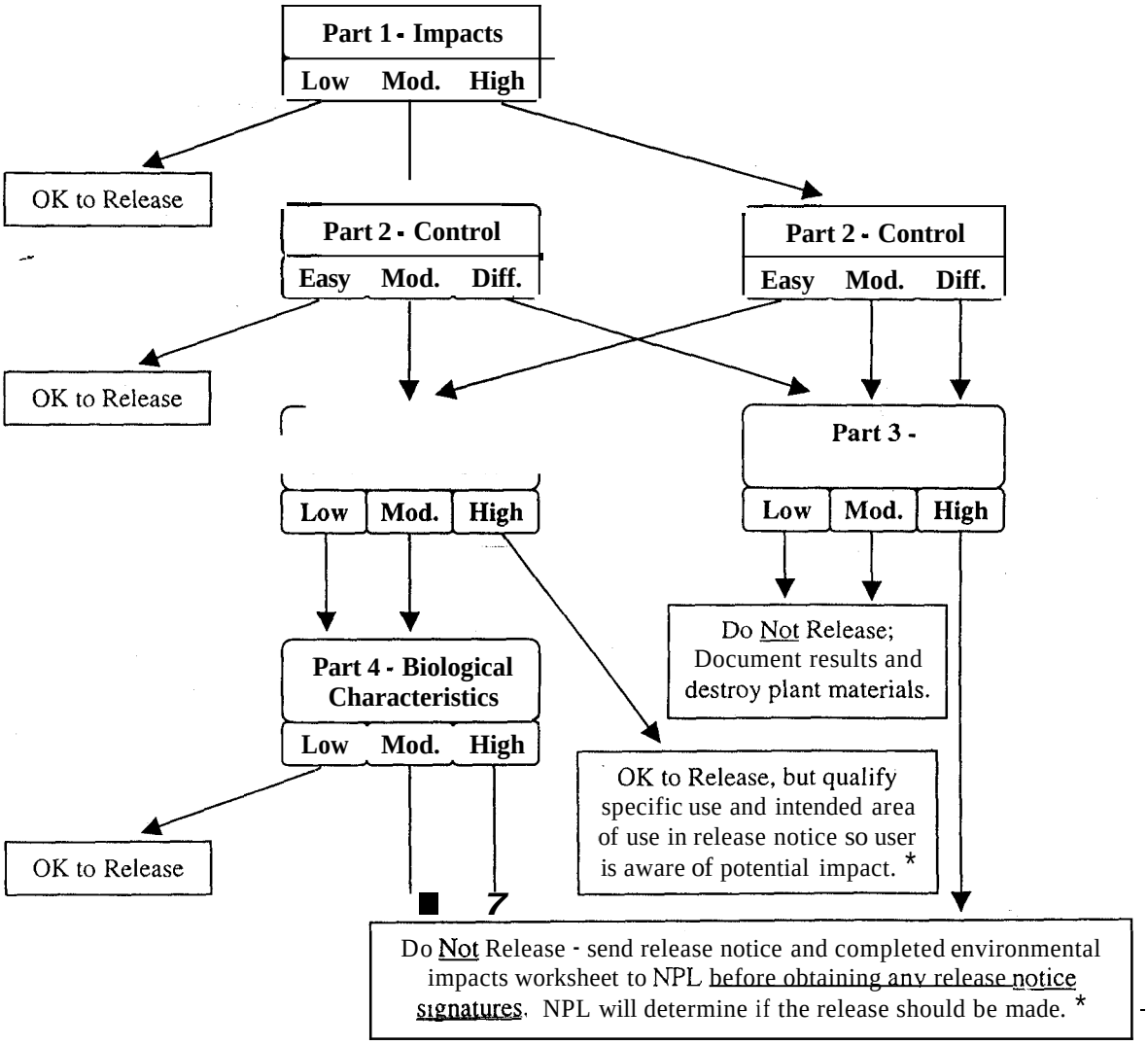
Section **B.** Scoring:and Interpretation

Based on the scores from above, circle the points range you scored to determine the appropriate interpretation. The interpretation will be used to determine the course of action for the release.

Part	Points Scored	Interpretation
Part 1. Impacts on Habitats, Ecosystems, and Land Use	**0-20**	**Low** chance plant is going to affect the environment
	21-30	Moderate chance plant is going to affect the environment
	31-45	**High** chance plant is going to affect the environment
Part **2.** Ease of Management	0-20	***Easy*** to control
	21-30	Moderate to control
	31-40	Difficult to control
Part 3. Conservation Need and Plant Use	0-5	**Low** need
	6-9	Moderate need
	10-15	High need
Part **4.** Biological Characteristics	0-25	**Low** chance plant is going to spread
	26-40	Moderate chance plant is going to spread
	41-70	High chance plant is going to spread

Section C. Action to Take for Releasing; Plants

Based on the interpretation above, follow the decision tree below. Start with your interpretation rating for Part 1 (Low, Moderate, or High) and follow the appropriate arrow to the next level.



* Indicates that an Environmental Assessment or Environmental Impact Statement may need to be prepared prior to release (see NPMM Part 540.73(a)(3)).

Worksheet Revised 1/6/00